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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/842,802	04/27/2001	Takao Noguchi	206645US0	2819

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EXAMINER

SONG, MATTHEW J

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 04/07/2003

14

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/842,802

Applicant(s)

NOGUCHI ET AL.

Examiner

Matthew J Song

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 January 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claim 1 is objected to because of the following informalities: Claim 1 recites "said Si substrate, which buffer layer includes an oxide" in line 3. The language is confusing. The examiner recommends changing "which" to "said". Appropriate correction is required.
2. Claim 1 is objected to because of the following informalities: Claim 1 recites "on said buffer layer, which film has a (100) or (001) orientation" in lines 5-6. The language is confusing. The examiner recommends changing "which" to "said". Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-9 are rejected under 35 U.S.C. 102(b) as being anticipated by Nashimoto (US 5,834,803).

Nashimoto discloses a single crystal substrate 1 of silicon (100) (col 3, ln 65 to col 4, ln 5 and col 10, ln 20-35), an epitaxial buffer layer 5 of MgO, ZrO₂ or Y₂O₃ (col 4, ln 10-15), a first ferroelectric thin film layer 2 and a second ferroelectric thin film layer 3, thereon. Nashimoto also discloses the first and second ferroelectric thin films include ABO₃ type ferroelectric substances such as LiNbO₃, PZT and PbTiO₃ (col 4, ln 16-67 and col 10, ln 35-40). Nashimoto

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also discloses a PbTiO_3 (001) film grown on a buffer and the PbTiO_3 is a perovskite (col 10, ln 41-67). Nashimoto also discloses the first and second ferroelectric thin films may be formed from different ferroelectric substances (col 4, ln 55-60).

Referring to claims 2 and 4, Nashimoto discloses a PbTiO_3 thin film perovskite, as applicant. Nashimoto is silent to the thin film has insulating properties. The PbTiO_3 film taught by Nashimoto will inherently have similar insulating properties, as claimed by applicant, because the film is made of a similar material, as taught by applicant.

Referring to claim 5, Nashimoto discloses PZT.

Referring to claim 6, Nashimoto discloses the ferroelectric thin film is used as an elastic wave element, infrared pyroelectric elements and optical guides (col 1, ln 1-67), this reads on applicant's electron device.

Referring to claim 7-9, Nashimoto discloses a $\text{Si}(100)$ substrate, a buffer layer of ZrO_2 or Y_2O_3 , an epitaxial perovskite with a (001) orientation and a ferroelectric grown thereon.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nashimoto (US 5,834,803) in view of Nashimoto (US 5,776,621).

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Nashimoto ('803) discloses all of the limitations of claim 3, as discussed previously, except an electrically conductive thin film between the perovskite oxide thin film and the oxide buffer layer.

In a method of forming a ferroelectric thin film element, note entire reference, Nashimoto ('621) teaches a buffer thin film of epitaxial MgO is formed on a single crystal substrate, a metallic thin film is formed on the buffer layer, this reads on applicant's electrically conductive thin film, and a epitaxial ferroelectric thin film is further formed on the metallic thin film (col 3, ln 30-50). Nashimoto ('621) also teaches the ferroelectric film should have a perovskite structure and the metal film can be made of Pt (col 4, ln 1-40). Nashimoto ('621) also teaches the double layer composed of the buffer layer and the metallic thin film on the semiconductor single crystal substrate promotes the epitaxial grow of the ferroelectric thin film and serves as a underlying electrode of an element using the ferroelectric thin film (col 5, ln10-30). It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Nashimoto ('803) with Nashimoto's ('621) metallic film on a buffer layer and growing a ferroelectric thereon to promote epitaxial growth of the ferroelectric thin film.

Response to Arguments

7. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

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8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Park et al ("Fabrication of $\text{PbZr}_x\text{Ti}_{1-x}\text{O}_3$ Films on Si Structures Using Y_2O_3 Buffer layers") teaches a Si substrate, a Y_2O_3 buffer layer and a PZT layer grown thereon, note entire reference.

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J Song whose telephone number is 703-305-4953. The examiner can normally be reached on M-F 9:00-5:00.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on 703-308-3868. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Matthew J Song
Examiner
Art Unit 1765

MJS
April 2, 2003



BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700